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TITLE: Adaptive threshold of handoff in mobile telecommunication systems

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INVENTOR-INFORMATION:

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US-CL-CURRENT: 455/437, 455/436, 455/67.1

ABSTRACT:

A method and apparatus for adapting the handoff threshold in a mobile communication system. The method includes the steps of evaluating the signal quality for the communication and lowering the dynamic threshold to encourage handoff if the signal quality indicator is lower than a preset quality threshold. The preset quality threshold represents a minimum acceptable signal quality level. The dynamic threshold may, in the alternative, be raised to discourage handoff if the signal quality indicator of the communication is at or near a maximum signal quality representing a signal having few errors. The apparatus includes means for scanning the radio environment at the mobile unit to evaluate signal strength and signal quality conditions of alternative channels in the same or neighboring cells, means for determining whether the mobile unit is participating in an off-hook communication or a standby communication, means for selecting a dynamic threshold corresponding to a signal strength value in accordance with the signal quality of the present communication and whether the signal quality is below or at a maximum or minimum value, and means for handing off the communication to an alternative channel if the signal strength of the channel measured at the mobile unit exceeds the dynamic threshold.

22 Claims, 7 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 6

Brief Summary Text - BSTX:

In yet another aspect of the present invention, a method is provided for adjusting a dynamic threshold for allowing handoff of a

mobile unit communication. The method includes the steps of determining a signal strength indicator and a signal quality indicator for the communication, and adjusting the dynamic threshold in accordance with conditions of the communication at the mobile unit, including the link quality and whether the mobile unit is presently off-hook or in standby mode.

Detailed Description Text - DETX:

Next, the link quality of the current communication channel is evaluated. First, the link quality indicator (LQI) of the active channel is compared with a maximum LQI value that corresponds to a nearly error-free channel. If the LQI of the active channel is equal to the maximum, the dynamic handoff threshold is set at box 136 to RBN*D, which increases the threshold value. However, if the LQI value is below the maximum LQI, box 140, via procedure route 138, determines whether the actual LQI value is greater than a threshold (LQI.sub.TH). The threshold LQI (LQI.sub.TH) represents a voice or data quality level that is the minimum acceptable quality to a user. If the LQI_ACT is greater than LQI.sub.TH, the dynamic handoff threshold is adjusted at box 142 to be equal to the larger of either 1 or RBN-1, or Max(1,RBN-1). This step lowers the threshold to a moderate degree to encourage handoff if the link quality appears to be in transition or otherwise degrading. In the alternative, if the LQI_ACT is not greater than LQI.sub.TH, the dynamic handoff threshold is adjusted at box 144 to be equal to D. This lowers the threshold more significantly to ensure that the threshold results in handoff during the next procedure cycle shown in FIG. 4.

Detailed Description Text - DETX:

Next, the link quality of the current communication channel is evaluated. The link quality indicator (LQI) of the standby channel is compared with a maximum LQI value that corresponds to a nearly error-free channel. If the LQI of the standby channel is equal to the maximum, the dynamic handoff threshold is set at box 164 to (RBN+1) *D, which increases the threshold value significantly and discourages handoff. If the LQI value is below the maximum LQI, box 168 determines whether the standby LQI value is greater than a threshold LQI. The threshold LQI (LQI.sub.TH) represents a voice or data quality level that is the minimum acceptable quality to a user. If the LQI_SB is greater than LQI.sub.TH, the dynamic handoff threshold is adjusted at box 170 to be equal to RBN*D. This step raises the threshold to a moderate degree to discourage handoff if the link quality appears to be in transition. If the LQI_SB is not greater than LQI.sub.TH, the dynamic handoff threshold is adjusted at box 174 to be equal to D. This lowers the threshold more significantly to ensure that the threshold results in handoff during the next procedure cycle shown in previous FIG. 4.

Claims Text - CLTX:

1. A method of handing off a cellular communication between a mobile unit and a base station within a cellular network, said communication having a signal strength and signal quality measurable at said mobile unit, said method including the steps of: scanning the radio environment at the mobile unit to evaluate signal strength conditions of the present and alternative channels in the radio environment; scanning the radio environment at the mobile unit to evaluate signal quality conditions of the present and alternative channels in the radio environment, wherein said signal quality is derived from at least one link quality indicator; determining a dynamic threshold based at least in part on a signal strength value and whether said mobile unit is participating in an off-hook communication or a standby communication, and variably adjusting the dynamic threshold based at least in part on the signal quality of the present communication and whether said signal quality is below or at a maximum or minimum value; and handing off the communication to one of said alternative channels if the difference between the signal strength of the present communication and one of said alternative channels measured at the mobile unit exceeds said dynamic threshold.

Claims Text - CLTX:

14. A method for adjusting a dynamic threshold for allowing handoff of a mobile unit communication being received at the mobile unit on a selected channel, said mobile unit having scanning capability and said threshold is based at least in part on a signal strength level, said method comprising: determining a signal strength indicator for said communication; determining a signal quality indicator for said communication, wherein said signal quality indicator is derived from at least one link quality indicator; and adjusting the dynamic threshold in accordance with conditions of said communication at the mobile unit including whether the mobile unit is presently off-hook or in standby mode, the signal strength indicator and the signal quality indicator, wherein said dynamic threshold is based at least in part on said signal strength level.

Claims Text - CLTX:

16. The method of claim 15 wherein said dynamic threshold is adjusted by lowering the dynamic threshold if the signal quality indicator is lower than a preset quality threshold that represents a minimum acceptable signal quality level, and raising the dynamic threshold if the signal quality indicator of the communication is at or near a maximum signal quality representing a signal having few errors.

Claims Text - CLTX:

18. A method for adjusting a dynamic signal strength threshold for allowing handoff of a mobile unit communication, said method comprising: evaluating the signal quality for said communication, wherein said signal quality is derived from at least one link quality; lowering the dynamic threshold to encourage handoff if the signal quality indicator is lower than a preset quality threshold that represents a minimum acceptable signal quality level, wherein said dynamic threshold is based at least in part on a signal strength level and whether said mobile unit communication is in an off-hook or standby mode; and raising the dynamic threshold to discourage handoff if the signal quality indicator of the communication is at or near a maximum signal quality representing a signal having few errors, wherein said dynamic threshold is based at least in part on said signal strength level and whether said mobile unit communication is in an off-hook or standby mode.

Current US Original Classification - CCOR:

455/437